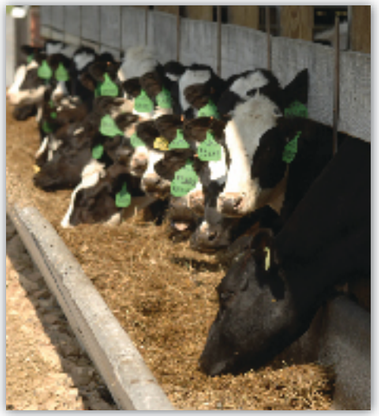
Using Feed Management to Reduce Phosphorus in Manure - Virginia

Excess phosphorus from animal manure is one of a number of sources of pollution to Virginia waterways and the Chesapeake Bay. Using a CIG grant, Virginia Tech is leading an extensive, statewide project to help dairy farmers reduce the amount of phosphorus in manure through precision feed management.



Precision feeding helps reduce nutrient losses.

About 80 percent of the phosphorus consumed by livestock is excreted in manure. Farmers who reduce phosphorus levels in feed rations receive incentive payments between $3 and $12 per cow. Less phosphorus in the feed means less phosphorus in the manure.

As part of the project, team members work with herd nutritionists and Virginia Cooperative Extension agents to design custom feed programs for each herd. Samples of feed and manure are analyzed to measure changes in phosphorus levels. The three-year project began in 2006 with 215 herds enrolled in the program. Virginia Tech is also working with 10 farms to demonstrate precision feeding, methods for improving forage quality, and ways to reduce nutrient losses from wasted feed.

Partners in the project include NRCS, the Virginia Department of Conservation and Recreation, Virginia Cooperative Extension, Cumberland Valley Analytical Service, and the Dairy Science Department at Virginia Tech. According to Dr. Charlie Stallings, to date, the project has provided $90,000 in incentive payments and potentially reduced phosphorus by 45 tons per year for the 30,000 cows enrolled in the project.

Solar Powered Watering Systems for Livestock - New York

The New York Finger Lakes Resource Conservation and Development (RC&D) Council received a CIG grant to assist New York livestock farmers with the installation of solar powered watering systems. These systems provide a cost effective way of making water available to livestock in remote pastures that otherwise could not be utilized. This project will demonstrate the advantages of using renewable energy to produce electricity in order to operate livestock watering systems. The project, in conjunction with the establishment and expansion of prescribed grazing systems, will also reduce livestock farms' dependency on petroleum based energy products. In addition, by strategically locating these solar powered watering systems, livestock can be kept out of streams, lakes and rivers thus improving water quality.

An RC&D staff member tests the solar-powered watering system after installation.

Eight livestock producers have signed agreements with the Finger Lakes RC&D Council to install solar powered livestock watering systems. Word of the project has traveled to western and central New York, and further inquiries about this innovative technology continue to be received at the RC&D office.

For more information, visit www.nrcs.usda.gov/programs or call (202) 720-4527.
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Innovative Technologies. Innovative Successes.

Exploring Conservation Technologies in the Chesapeake Bay Watershed:

Maryland
Virginia
Pennsylvania
Delaware
New York
West Virginia
District of Columbia

Conservation Innovation Grants (CIG)

Through CIG, the USDA Natural Resources Conservation Services (NRCS) utilizes Environmental Quality Incentives Program funds to award competitive grants to non-Federal governmental or non-governmental organizations, Tribes, or individuals. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns. CIG benefits agricultural producers by providing more options for environmental enhancement and compliance with Federal, State, and local regulations.

Successful CIG projects support innovative approaches or activities that encompass the development and field testing, evaluation, and implementation of conservation adoption incentive systems, including market-based systems; or, promising conservation technologies, practices, systems, procedures, or approaches. CIG grants are awarded to proposals that address at least one of the following categories: natural resource concerns (water resources; soil resources; atmospheric resources; grazing land and forest health; and wildlife habitat) and technology (improved on-farm energy efficiency and water management).

Starting in 2008, NRCS entered into an agreement with the National Fish and Wildlife Foundation to assist with the solicitation, evaluation, grant management, administration, and technical oversight of competitive CIG grants within the Chesapeake Bay Watershed. CIG funded 11 innovative projects in 6 states to protect water quality, recycle nutrients, and improve wildlife habitat in the Chesapeake Bay Watershed.

The following summaries describe some alternative technologies that hold promise for addressing environmental concerns and challenges on the farm. The summaries were compiled from the six-state Chesapeake Bay Watershed and represent some of the latest and most promising technologies in water quality improvements.

Litter Provides a Heating System, Reduces Pollutants and Sequesters Carbon - West Virginia

Two of the greatest challenges currently facing the poultry industry are the high cost of energy and environmental concerns surrounding the nutrient loading into the Chesapeake Bay Watershed from poultry waste. An NRCS CIG recipient responded to the challenge by demonstrating that energy may be extracted from chicken litter to provide a bio-based heating system. Coaltec Energy, USA Inc. installed a bio-based heating system on the Frye Poultry Farm in Hardy County, West Virginia. The system, using the poultry litter as fuel, heats the poultry houses and significantly reduces fuel costs for the farmer. The gasification process converts the poultry litter to mineral ash or bio-char, which can be land-applied as a soil amendment. This adds to soil productivity and creates a long-term Carbon sink, affecting greenhouse gas issues and reducing nutrient loading and the subsequent run-off into the Chesapeake Bay Watershed tributaries. The dry-heated air produced also has a positive impact on bird growth and health. The humidity level in the house is lower–over 20 percent less, and the bird's growth was as much as 7 percent higher. For more information, go to http://www.coaltecenergy.com/poultrylitterproject.html.

A gasifier converts poultry litter to fuel for heating poultry houses.

Excess Manure Use Helps Improve Water Quality and Produces Bioenergy - Pennsylvania

Pennsylvania houses one of the largest concentrations of livestock and poultry in the Nation. The nutrient accumulation on agricultural lands due to manure handling is a water quality concern. In addition, as a top coal producer, the state has abandoned mine lands that need nutrients to accelerate their reclamation. With the help of an NRCS CIG grant, Pennsylvania Environmental Council and partners are conducting a project that aims to offer solutions to four environmental problems: soil nutrient accumulation, nutrient rich runoff, mine land reclamation, and energy production.

Manure nutrients are being transported out of the watershed with excess nutrients onto abandoned mine lands. Use and sequestration of these nutrients will improve water resources through soil stabilization, reduction in erosion, and a potential reduction in acid mine drainage.

The sites are being used to grow switchgrass and other native grasses that will be used as bioenergy crops. The CIG project will also provide an opportunity for participating producers to engage in the emerging nutrient trading program for the Chesapeake Bay Watershed in Pennsylvania.

Excess manure is being transported to abandoned mine lands to produce switchgrass, a bioenergy crop.

CIG Field Trials Remove 99 percent of Phosphorus from Treated Agricultural Drainage Water on the Delmarva Peninsula – Maryland

The University of Maryland is evaluating ways to treat water in agricultural drainage ditches to remove nutrients and improve water quality before the water enters the Chesapeake Bay. Agricultural drainage ditches, which are common on the Delmarva Peninsula, can serve as a major transport pathway for nutrients, sediments, and other contaminants.

In 2007 through CIG, NRCS awarded $999,683 to a team led by Dr. Joshua McGrath of the University's College of Agriculture and Natural Resources for a three year evaluation project. "This CIG project has enormous potential," said Dr. McGrath. "The project will allow us to collect key data at a variety of sites, and will help us bridge obstacles to implementing this innovative technology that will ultimately curb the flow of phosphorus into the Bay."

At trial site, the weir (white wall) temporarily slows and pools the ditch water allowing the phosphorus from farm runoff to be absorbed by the gypsum filter.

The team is evaluating the ditches as a possible intervention point where phosphorus (P) in runoff from farm soils can be prevented from entering the Bay. The field trials are testing the use of a phosphorus absorbing material placed within drainage ditches to act as a P "filter." This unique system captures and removes P from the ditch water allowing the materials to be land applied.

Field trials of the promising conservation treatment system have shown a high likelihood of success, at times removing approximately 99 percent of the P from treated water. In addition to removing P from ditch water, these treatment systems have the potential to remove nitrogen, sediment, and other contaminants.

Innovative Animal Waste Management Technologies - Delaware

Dairy farmers in the Delmarva Peninsula could soon have a new, innovative way to manage animal waste and improve nutrient balance on their agricultural operations. The University of Delaware (UD) received nearly $300,000 through the CIG program to demonstrate the potential of an innovative technology, sand-manure separation and manure solids separation, within the Chesapeake Bay Watershed.

The technology is designed to separate sand-bedded manure into reusable sand, and separate the organic solids from the liquids, in order to improve dairy manure handling. The separation technology is a component of a new waste storage and handling system, and will also improve storage and composting methods.

The separator system was installed in early 2008. Scott Hopkins, UD farm superintendent, said the technology has been working well. "It's getting good bio solids out and recovering 90 percent of the sand. Long term goals include using bio solids along with other waste to generate compost." UD hopes this technology, developed by McLanahan Corporation, will demonstrate a potential solution to other producers in the region facing nutrient surpluses or animal waste concerns.

Sand-bedded manure is filtered through the separation system.